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# BHCTP Monthly Discharge Monitoring Report

Month: May-18

Facility: Central Treatment Plant

Location: Bunker Hill Superfund Site

Contract Number: W912DW-16-C-0012 Amec Foster Wheeler

| | | |
|---|---|---|
| Total Flow For The Month From 006 Outfall: | 78,709,500 | gallons estimated |
| Sludge pumping to CIA sludge pond: | 11,922,600 | gallons estimated |
| **Clarifier Water Used by Water Trucks** | 12,000 | gallons estimated |
| Total Flow From Kellogg Tunnel: | 92,414,520 | gallons |

Percent of Influent Successfully Treated: 100.0%

13 sample days * 6 parameters (Pb, Cd, Zn, Mn, TSS & pH) = 78 potential exceedances
**78 - 0 exceedances = 78 78/78 = 100%**

Results of Sampling Efforts:

All sampling has been performed in accordance with specifications and the Sampling and Analysis Plan.

Performance Evaluation (PE) sampling was not performed for this reporting period.

Trip blank and rinsate sampling was performed, with the results being reported on the 'PTM-004,RB,TB' page of this DMR.

Highlights of Plant Maintenance and/or Plant Optimization:

**05-01-18** Performed monthly fire extinguisher inspection. All CTP fire extinguishers are fully charged and in good working condition at this time.

**05-01-18** Performed monthly pump and motor inspection. All CTP pumps and motors are in good condition at this time.

**05-01-18** Reviewed the lock out, tag out log with the operating staff. The #1 lined storage pond pump is the only CTP component remaining on the lock out, tag out log at this time.

**05-01-17** CTP process sludge wasting is now based on Clarifier sludge bed depth rather than sludge weight.
Operators will attempt to maintain the Clarifier sludge bed between 65" and 30" until further notice.
Normal compaction of the Clarifier sludge bed should resume upon decreasing flows from the Bunker Hill mine.
Sludge bed depths and daily sludge wasting times are reported on the daily spring runoff report.

**05-02-18** Flocculant dosage was increased from approximately 1.7ppm to approximately 2ppm. The flocculant dosage was increased to aid in sludge bed compaction.

**05-03-18** Operators removed the #1 lined storage pond pump and motor from the lined pond pump house. The pump and motor were transferred to the BHCTP storage building. The pump and motor manufacture representative will pickup the pump and motor and perform the needed repairs.

**05-08-18** The treated outfall flow meter has failed. Treated outfall flow will be estimated using KT flow meter data and estimated sludge pumping until further notice.

**05-08-18** Operators increased the process pH set point to 8.60 from 8.50. The pH set point was increased to aid in sludge bed compaction and in response to the KT flow increase. KT flow increased to 2,300 gpm from 2,150 gpm.

**05-08-18** Operators performed the monthly no load emergency generator run test. The emergency generator operated for one half hour as programmed with no issues or errors to report.

**05-08-18 16:00** Operators increased the pH set point to 8.80 as approved by the USACE COR. The operating staff began

24/hr manual adjustments of the lime injection system and lime system maintenance in response to KT flow increase.
May 2018 spring runoff report is attached.

**05-22-18** Operators decreased the operating pH set point to 8.60 from 8.80. Treated discharge zinc levels have decreased below .200 mg/L. Lime slurry solids was reduced from 14% to approximately 12%.

**05-22-18** Operators performed the monthly full load emergency generator run test. The emergency generator operated all CTP components for one hour as programmed with no issues or errors to report.

**05-22-18** Operators replaced the Rapid Mix Tank gear box to motor drive coupler. Three connection couplers remain in stock at this time.

**05-23-18** Operator overtime hours have been reduced to approximately 4 hours per day. The additional overtime is needed to control the sludge bed in the Clarifier and dispose of the increased lime system waste grit.

**05-31-18** Performed the monthly Kellogg Tunnel flow meter reset and total flow documentation.
The CTP treated outfall flow meter remains in fail mode at this time. Flow meter failed 05-08-18.

**05-31-18** Reduced the operating pH set point to 8.50 from 8.60. Approved by Wood management (CTP Process Engineer).

- The Kellogg Tunnel discharge flow increased by 9% from May 2017, from 84.2 mg to 92.4 mg.

- The Kellogg Tunnel zinc concentration increased by 33% from May 2017, from an average of 206 mg/L to 274 mg/L.

- The CTP operating pH set point was increased from 8.4 to 8.8 during this reporting period.

- The flocculent dosage was increased from approximately 1.4 PPM to 3.8 PPM during this reporting period.

- The CTP sludge recycle rate remained at 400 gpm.

- CTP operators received no off-shift auto dialer call-out alarms.

- CTP operators performed continuous lined storage pond pumping May 10 - May 17th.

- CTP operators performed 24hr on site process operations May 8th - May 20th.

- CTP operators verified Aeration Basin pH probe and grab sample values periodically each day.

Lessons Learned:
No significant lessons learned during this reporting period.

| MONITORING PERIOD | | | | | |
|---|---|---|---|---|---|
| YEAR | MO | DAY | YEAR | MO | DAY |
| 2018 | 5 | 1 | 2018 | 5 | 31 |

| PARAMETER | | Quantity or Loading | | | Quality or Concentration | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | MONTHLY AVERAGE | DAILY MAXIMUM | UNITS | MINIMUM | MONTHLY AVERAGE | DAILY MAXIMUM | UNITS | FREQUENCY OF ANALYSIS | SAMPLE TYPE |
| pH | Sample Measurement | | | | 6.60 | | 7.60 | | Continuous | Meter |
| | Permit Required | | | | 6.0 | | 10.0 | | | |
| Flow Thru Treatment Plant | Sample Measurement | 2.54 | 3.09 | mgd | | | | | | |
| | Permit Required | | Daily | | | | | | | |
| Lead Total - Pb Effluent | Sample Measurement | 0.08 | 0.15 | lbs/day | | 0.004 | 0.006 | mg/L | three samples/ week | Comp 24 |
| | Permit Required | 14.8 | 37.0 | | | 0.30 | 0.60 | mg/L | | |
| Zinc Total - Zn Effluent | Sample Measurement | 5.30 | 8.87 | lbs/day | | 0.26 | 0.43 | mg/L | three samples/ week | Comp 24 |
| | Permit Required | 36.2 | 91.3 | | | 0.73 | 1.48 | mg/L | | |
| Cadmium - Cd Effluent | Sample Measurement | 0.06 | 0.193 | lbs/day | | 0.003 | 0.008 | mg/L | three samples/ week | Comp 24 |
| | Permit Required | 2.40 | 6.10 | | | 0.050 | 0.100 | mg/L | | |
| Manganese - Mn Effluent | Sample Measurement | 91 | 178 | lbs/day | | 4.2 | 6.9 | mg/L | three samples/ week | Comp 24 |
| | No Permit Required | | | | | N/A | N/A | mg/L | | |
| Total Suspended Solids - TSS | Sample Measurement | 69.2 | 589 | lbs/day | | 3.6 | 25.0 | mg/L | three samples/ week | Comp 24 |
| | Permit Required | 985 | 1907 | | | 20 | 30 | mg/L | | |

PREPARED BY: GARY FULTON

REVIEWED BY: BRIAN JOHNSON

**NPDES DISCHARGE POINT 006**
**CENTRAL TREATMENT PLANT**
**MONTH: May-18**

| DAY | LEAD (Pb) | | ZINC (Zn) | | CADMIUM (Cd) | | MANGANESE (Mn) | | pH | FLOW | TSS | | LOADING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mg/L | lbs/day | mg/L | lbs/day | mg/L | lbs/day | mg/L | lbs/day | | mgd | mg/L | lbs/day | kg/day |
| 1 | | 0.137 | | 7.90 | | 0.02 | | 116 | | 2.69 | | 22.4 | 10.2 |
| 2 | 0.0061 | 0.145 | 0.352 | 8.37 | 0.00080 | 0.02 | 5.16 | 123 | 6.60 | 2.85 | 1.0 | 23.8 | 10.8 |
| 3 | | 0.154 | | 8.87 | | 0.02 | | 130 | | 3.02 | | 25.2 | 11.4 |
| 4 | 0.0054 | 0.126 | 0.227 | 5.30 | 0.00080 | 0.02 | 5.36 | 125 | 6.80 | 2.80 | 1.8 | 42.0 | 19.1 |
| 5 | | 0.129 | | 5.42 | | 0.02 | | 128 | | 2.86 | | 43.0 | 19.5 |
| 6 | | 0.123 | | 5.18 | | 0.02 | | 122 | | 2.73 | | 41.1 | 18.6 |
| 7 | 0.0025 | 0.057 | 0.228 | 5.24 | 0.0075 | 0.17 | 6.89 | 158 | 7.00 | 2.76 | 1.4 | 32.2 | 14.6 |
| 8 | | 0.064 | | 5.88 | | 0.19 | | 178 | | 3.09 | | 36.1 | 16.4 |
| 9 | 0.0043 | 0.067 | 0.354 | 5.52 | 0.00080 | 0.01 | 5.82 | 90.8 | 6.90 | 1.87 | 2.0 | 31.2 | 14.2 |
| 10 | | 0.036 | | 3.00 | | 0.01 | | 49.2 | | 1.01 | | 16.9 | 7.68 |
| 11 | 0.0036 | 0.059 | 0.345 | 5.63 | 0.00080 | 0.01 | 5.89 | 96.1 | 6.70 | 1.96 | 1.8 | 29.4 | 13.3 |
| 12 | | 0.059 | | 5.63 | | 0.01 | | 96.1 | | 1.96 | | 29.4 | 13.3 |
| 13 | | 0.065 | | 6.24 | | 0.01 | | 107 | | 2.17 | | 32.6 | 14.8 |
| 14 | 0.0025 | 0.040 | 0.434 | 6.94 | 0.0080 | 0.13 | 2.34 | 37.4 | 6.80 | 1.92 | 3.4 | 54.4 | 24.7 |
| 15 | | 0.040 | | 7.00 | | 0.13 | | 37.7 | | 1.93 | | 54.8 | 24.9 |
| 16 | 0.0025 | 0.047 | 0.311 | 5.85 | 0.0055 | 0.10 | 1.42 | 26.7 | 6.70 | 2.25 | 25 | 470 | 213 |
| 17 | | 0.059 | | 7.32 | | 0.13 | | 33.4 | | 2.82 | | 589 | 267 |
| 18 | 0.0038 | 0.092 | 0.135 | 3.27 | 0.00080 | 0.02 | 2.63 | 63.6 | 7.60 | 2.90 | 2.0 | 48.4 | 22.0 |
| 19 | | 0.092 | | 3.26 | | 0.02 | | 63.4 | | 2.89 | | 48.2 | 21.9 |
| 20 | | 0.093 | | 3.30 | | 0.02 | | 64.3 | | 2.93 | | 48.9 | 22.2 |
| 21 | 0.0042 | 0.100 | 0.163 | 3.88 | 0.00080 | 0.02 | 2.51 | 59.7 | 7.10 | 2.85 | 1.6 | 38.1 | 17.3 |
| 22 | | 0.100 | | 3.89 | | 0.02 | | 59.9 | | 2.86 | | 38.2 | 17.31 |
| 23 | 0.0033 | 0.079 | 0.210 | 5.01 | 0.00080 | 0.02 | 3.07 | 73.3 | 7.20 | 2.86 | 2.2 | 52.5 | 23.8 |
| 24 | | 0.071 | | 4.50 | | 0.02 | | 65.8 | | 2.57 | | 47.2 | 21.4 |
| 25 | 0.0046 | 0.098 | 0.238 | 5.09 | 0.00080 | 0.02 | 5.45 | 117 | 7.30 | 2.56 | 1.6 | 34.2 | 15.5 |
| 26 | | 0.100 | | 5.15 | | 0.02 | | 118 | | 2.59 | | 34.6 | 15.7 |
| 27 | | 0.100 | | 5.15 | | 0.02 | | 118 | | 2.59 | | 34.6 | 15.7 |
| 28 | 0.0025 | 0.054 | 0.243 | 5.23 | 0.0075 | 0.16 | 5.36 | 115 | 7.10 | 2.58 | 1.0 | 21.5 | 9.8 |
| 29 | | 0.054 | | 5.23 | | 0.16 | | 115 | | 2.58 | | 21.5 | 9.8 |
| 30 | 0.0025 | 0.055 | 0.137 | 3.00 | 0.0055 | 0.12 | 3.31 | 72.6 | 7.20 | 2.63 | 2.4 | 52.6 | 23.87 |
| 31 | | 0.055 | | 3.00 | | 0.12 | | 72.6 | | 2.63 | | 52.6 | 23.87 |
| | | | | | | | | | | | | | |
| Total | 0.048 | 2.549 | 3.377 | 164.264 | 0.040 | 1.777 | 55.210 | 2832.797 | 91.000 | 78.710 | 47.200 | 2146.260 | 973.361 |
| Sample Events | 13 | 31 | 13 | 31 | 13 | 31 | 13 | 31 | 13 | 31 | 13 | 31 | 31 |
| Daily Average | 0.004 | 0.082 | 0.260 | 5.30 | 0.003 | 0.057 | 4.2 | 91 | 7.00 | 2.54 | 3.63 | 69.2 | 31.40 |
| Lab Detection Limit | **0.0025** | | **0.003** | | **0.0008** | | **0.0017** | | **0.01** | | **0.080** | | |
| | | | | | | | | | | | | | |
| MIN | 0.003 | 0.036 | 0.135 | 2.995 | 0.001 | 0.007 | 1.420 | 26.698 | 6.600 | 1.014 | 1.000 | 16.924 | 7.675 |
| MAX | 0.006 | 0.154 | 0.434 | 8.871 | 0.008 | 0.193 | 6.890 | 177.551 | 7.600 | 3.088 | 25.000 | 588.531 | 266.908 |

Notes:
(X mg/L) * (1 kg/10^6 mg) * (2.205 lbs/kg) * (3.785 L/gal) * (10^6 gal/Mgal) * (Y Mgal/day) = (X) * (Y) * (8.345) in lbs/day
(X lbs/day) * (1 kg/2.205 lbs) = (X) / (2.205) in kg/day

*verified by Brian Johnson, 06/14/18*

**KELLOGG TUNNEL DISCHARGE**
**CENTRAL TREATMENT PLANT**
**MONTH: May-18**
**Data from SVL**

| DAY | LEAD (Pb) | | ZINC (Zn) | | CADMIUM (Cd) | | MANGANESE (Mn) | | pH | 006 FLOW | TSS | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | mg/L | lbs/day | mg/L | lbs/day | mg/L | lbs/day | mg/L | lbs/day | | mgd | mg/L | lbs/day | kg/day |
| 1 | | 16.21 | | 3,996 | | 10.71 | | 2,171 | | 2.69 | | 2,267 | 2,267 |
| 2 | | 17.17 | | 4,233 | | 11.34 | | 2,300 | | 2.85 | | 2,402 | 2,402 |
| 3 | 0.722 | 18.20 | 178 | 4,486 | 0.477 | 12.02 | 96.7 | 2,437 | 2.80 | 3.02 | 101 | 2,545 | 2,545 |
| 4 | | 16.86 | | 4,158 | | 11.14 | | 2,259 | | 2.80 | | 2,359 | 1,070 |
| 5 | | 17.23 | | 4,248 | | 11.38 | | 2,308 | | 2.86 | | 2,411 | 1,093 |
| 6 | | 16.47 | | 4,060 | | 10.88 | | 2,206 | | 2.73 | | 2,304 | 1,045 |
| 7 | 0.687 | 15.80 | 206 | 4,738 | 0.523 | 12.03 | 94.1 | 2,164 | 2.80 | 2.76 | 117 | 2,691 | 1,220 |
| 8 | | 17.70 | 357 | 9,200 | | 13.48 | | 2,425 | | 3.09 | | 3,015 | 1,367 |
| 9 | | 10.72 | | 5,571 | | 8.161 | | 1,468 | | 1.87 | | 1,826 | 828.0 |
| 10 | 0.746 | 6.31 | 535 | 4,527 | 1.620 | 13.71 | 120 | 1,015 | 2.70 | 1.01 | 11.0 | 93.1 | 42.2 |
| 11 | | 12.18 | | 8,733 | | 26.44 | | 1,959 | | 1.96 | | 180 | 81.4 |
| 12 | | 12.18 | | 8,733 | | 26.44 | | 1,959 | | 1.96 | | 180 | 81.4 |
| 13 | | 13.50 | | 9,679 | | 29.31 | | 2,171 | | 2.17 | | 199 | 90.3 |
| 14 | 0.712 | 11.38 | 330 | 5,276 | 1.030 | 16.47 | 108 | 1,727 | 2.80 | 1.92 | 84.0 | 1,343 | 609.1 |
| 15 | | 11.48 | 519 | 8,368 | | 16.61 | 77.00 | 1,241 | | 1.93 | | 1,354 | 614.2 |
| 16 | | 13.39 | | 9,758 | | 19.37 | | 2,031 | | 2.25 | | 1,579 | 716.2 |
| 17 | 0.675 | 15.89 | 290 | 6,827 | 0.865 | 20.36 | 104 | 2,448 | 2.80 | 2.82 | 71.0 | 1,671 | 758.0 |
| 18 | | 16.34 | | 7,018 | | 20.93 | | 2,517 | | 2.90 | | 1,718 | 779.2 |
| 19 | | 16.28 | | 6,994 | | 20.86 | | 2,508 | | 2.89 | | 1,712 | 776.6 |
| 20 | | 16.51 | | 7,093 | | 21.16 | | 2,544 | | 2.93 | | 1,737 | 787.6 |
| 21 | 0.754 | 17.93 | 261 | 6,207 | 0.710 | 16.89 | 98.8 | 2,350 | 2.80 | 2.85 | 119 | 2,830 | 1,284 |
| 22 | | 17.99 | | 6,227 | | 16.94 | | 2,357 | | 2.86 | | 2,839 | 1,288 |
| 23 | | 18.00 | | 6,229 | | 16.95 | | 2,358 | | 2.86 | | 2,840 | 1,288 |
| 24 | 0.843 | 18.07 | 230 | 4,931 | 0.607 | 13.01 | 100 | 2,144 | 2.70 | 2.57 | 195 | 4,180 | 1,896 |
| 25 | | 18.04 | | 4,921 | | 12.99 | | 2,140 | | 2.56 | | 4,172 | 1,892 |
| 26 | | 18.25 | | 4,979 | | 13.14 | | 2,165 | | 2.59 | | 4,221 | 1,914 |
| 27 | | 18.25 | | 4,979 | | 13.14 | | 2,165 | | 2.59 | | 4,221 | 1,914 |
| 28 | 0.612 | 13.18 | 198 | 4,263 | 0.496 | 10.68 | 98.1 | 2,112 | 2.80 | 2.58 | 125 | 2,691 | 1,221 |
| 29 | | 13.18 | | 4,263 | | 10.68 | | 2,112 | | 2.58 | | 2,691 | 1,221 |
| 30 | | 13.42 | | 4,342 | | 10.88 | | 2,151 | | 2.63 | | 2,741 | 1,243 |
| 31 | 0.664 | 14.56 | 184 | 4,035 | 0.449 | 9.85 | 98.0 | 2,149 | 2.80 | 2.63 | 147 | 3,224 | 1,462 |
| | | | | | | | | | | | | | |
| Total | 6.42 | 473 | 3288 | 183072 | 6.78 | 478 | 995 | 66060 | 25.0 | 78.7 | 970 | 70239 | 35797 |
| Sample Events | 9 | 31 | 12 | 31 | 9 | 31 | 9 | 31 | 9 | 31 | 9 | 31 | 31 |
| Daily Average | 0.713 | 15.2 | 274.0 | 5,906 | 0.753 | 15.42 | 110.5 | 2,131 | 2.78 | 2.54 | 108 | 2266 | 1155 |

Notes:
(X mg/L) * (1 kg/10^6 mg) * (2.205 lbs/kg) * (3.785 L/gal) * (10^6 gal/Mgal) * (Y Mgal/day) = (X) * (Y) * (8.345) lbs/day
(X lbs/day) * (1 kg/2.205 lbs) = (X) / (2.205) kg/day

*verified by Brian Johnson, 06/14/18*

**PTM Effluent at Lined Storage Pond** **Month: May-18**
**CENTRAL TREATMENT PLANT**

| DATE | LEAD mg/L | ZINC mg/L | CADMIUM mg/L | pH s.u. CTP Lab | TSS mg/L |
|---|---|---|---|---|---|
| 05/03/18 | 0.0089 | 10.1 | 1.15 | 7.10 | 0.2 |
| | | | | | |
| 05/17/18 | 0.0075 | 12.1 | 1.36 | 7.00 | 0.4 |
| | | | | | |
| | | | | | |

**RINSATE AND TRIP BLANKS** **Month: May-18**
**CENTRAL TREATMENT PLANT**

**Rinsate and Trip Blank samples will be taken approximately every 20 QC events, or one each per month.**

| LOCATION Rinsate & Trip Blank | DATE | SAMPLE | LEAD mg/L | ZINC mg/L | CADMIUM mg/L |
|---|---|---|---|---|---|
| BHCTP Treated Outfall | | RB-05-02-18 | <0.0075 | <0.010 | <0.002 |
| Trip Blank (D.I.water) | | TB-05-02-18 | <0.0075 | <0.010 | <0.002 |

*verified by Brian Johnson, 06/14/18*

**CENTRAL TREATMENT PLANT** **MISCELLANEOUS FLOWS**

**Month :** **May-18**

| Date | **KT Flow Meter Reading** |
|---|---|
| **4/30/2018** | 0 |
| **5/31/2018** | 92,414,520 |
| **Total** | 92,414,520 |

| Date | **006 Flow Meter Reading** |
|---|---|
| **4/30/2018** | 0 |
| **5/31/2018** | 78,709,500 |
| **Total** | 78,709,500 |

**Lined Storage Pond Influent Flows**

**Sweeny Pump Station Reading**

| Date | #1 Pump | 620 gpm | #2 Pump | 500 gpm |
|---|---|---|---|---|
| **4/30/2018** | 170.0 | Hours | 785.0 | Hours |
| **5/31/2018** | 170.0 | Hours | 785.0 | Hours |
| Total Hours | 0.0 | Hours | 0.0 | Hours |
| Total Flow for 004/Sweeny For The Month = | | | 0 | Gallons |

**PTM Discharge Flow**

| Date | Flow (gpm) |
|---|---|
| 05/03/18 | 20.0 |
| 05/17/18 | 12.0 |

| Date | **Lined Storage Pond Water Level** | | | |
|---|---|---|---|---|
| **4/30/2018** | 750,000 | gal | Elev. = | 2268.5 |
| **5/31/2018** | 1,000,000 | gal | Elev. = | 2269.0 |

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**Old Mine Line Discharge Flow**

| Date | Flow (gpm) |
|---|---|
| NA | NA |

# Bunker Hill Central Treatment Plant

## Daily log May 2018

| | | | | AERATION BASIN | | | | | CLARIFIER | | | | | | CLARIFIER TROUGH -for- DISCHARGE 006 | | | | | | | | | RECYCLE SG | | LIME SLURRY | | | SLUDGE PUMP | | POND PUMP | | SLUDGE GUN TEST | | LINED POND |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | INFLUENT KT | | | a.m. | | p.m. | | a.m. | | p.m. | | | | pH a.m. | | pH p.m. | | Turbidity | | MTR | DO | 1/wk *c | | | | | Injection Valve | Est. | 600gpm | | | | | ESTIMATED |
| DATE | Operators | GPM | pH | SET | pH1 | grab | pH1 | grab | pH2 | grab | pH2 | grab | TURB | TEMP | Mtr | grab | Mtr | grab | Meter | Grab | Flow | PPM | TEMP | SG | GPM | SG | %solid | Closed/Open | pump # | min | ON | OFF | 10' Out | 20' Out | Elevation (mg) |
| 5/1 | GF,SB,GC | 2105 | | 8.5 | 8.5 | 8.5 | 8.7 | 8.8 | 8.3 | 8.0 | 8.3 | 8.0 | 0.50 | 50 | 7.9 | 8.0 | 7.9 | 7.8 | 1.00 | 0.62 | 2.69 | | | 1.039 | **400** | 1.084 | 12.8 | 149/42 | 3 | 330 | | | 67" | 48" | 2268.5 (0.75mg) |
| 5/2 | GF,SB,GC | | | 8.5 | 8.6 | 8.6 | 8.5 | 8.6 | 8.5 | 8.2 | 8.4 | 8.3 | 0.85 | 51 | 8.0 | 8.2 | 8.1 | 8.2 | 1.10 | 1.05 | 2.85 | 9.39 | 6.90 | 1.038 | **400** | 1.086 | 13.1 | 170/44 | 3 | 240 | | | 63" | 43" | 2269.0 (1.0mg) |
| 5/3 | GF,SB,GC | 2110 | 2.72 | 8.5 | 8.6 | 8.7 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.3 | 1.07 | 48 | 8.1 | 8.2 | 8.1 | 8.0 | 1.00 | 0.90 | 3.02 | | | 1.032 | **400** | 1.081 | 12.4 | 155/44 | 3 | 240 | | | 65" | 49" | 2269.0 |
| 5/4 | GF,GC | | | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.4 | 8.3 | 8.5 | 8.5 | 1.00 | 52 | 8.1 | 8.0 | 8.1 | 8.4 | 1.10 | 1.10 | 2.80 | | | 1.038 | **400** | 1.088 | 13.4 | 150/44 | 3 | 240 | | | 60" | 38" | 2269.0 |
| 5/5 | GC | | | 8.5 | 8.5 | 8.6 | 8.5 | 8.5 | 8.5 | 8.4 | 8.4 | 8.4 | 0.69 | 54 | 8.1 | 8.3 | 8.1 | 8.2 | 1.10 | 0.71 | 2.86 | | | 1.032 | **400** | 1.089 | 13.6 | 166/44 | 3 | 240 | | | 66" | 38" | 2269.0 |
| 5/6 | SB | | | 8.5 | 8.3 | 8.4 | 8.5 | 8.5 | 8.4 | 8.1 | 8.3 | 8.0 | 1.13 | 53 | 8.1 | 8.2 | 8.0 | 8.1 | 1.00 | 1.11 | 2.73 | | | 1.034 | **400** | 1.050 | 7.9 | 87/44 | 3 | 255 | | | 61" | 48" | 2269.0 |
| 5/7 | GF,SB | 2153 | 2.65 | 8.5 | 8.4 | 8.4 | 8.7 | 8.6 | 8.3 | 8.2 | 8.3 | 8.3 | 0.80 | 54 | 8.0 | 7.9 | 8.0 | 8.3 | 1.10 | 1.05 | 2.76 | | | 1.029 | **400** | 1.089 | 13.6 | 144/44 | 3 | 920 | #2,#3 10:00 | -13:00 | 64" | 44" | 2269.4 (1.2mg) |
| 5/8 | GF,SB,GC | 2277 | 2.57 | **8.7** | 8.5 | 8.5 | 8.4 | 8.4 | 8.4 | 8.4 | 8.2 | 8.1 | 0.87 | 54 | 8.0 | 8.3 | 7.9 | 8.0 | 1.10 | 0.97 | 3.09 | | | 1.030 | **400** | 1.087 | 13.3 | #1 10%, #2 150/45 | 3 | 971 | #3 12:45 | 19:40 | 70" | 56" | 2269.0 (1.0mg) |
| 5/9 | GF,SB,GC | 1450 | | **8.8** | 8.5 | 8.5 | 7.7 | 7.7 | 8.4 | 8.1 | 8.4 | 8.5 | 1.00 | 50 | 8.1 | 8.1 | 8.0 | 8.3 | 1.10 | 1.20 | 1.87 | 9.19 | 7.2c | 1.020 | **400** | 1.114 | 16.8 | #1 10%, #2 150/45 | 3 | 2000 | | | 85" | 64" | 2268.5 (0.75mg) |
| 5/10 | GF,SB,GC | 2535 | 2.59 | **8.8** | 8.7 | 8.6 | 8.9 | 9.0 | 8.4 | 8.6 | 8.4 | 8.4 | 0.87 | 50 | 8.1 | 8.4 | 8.1 | 8.1 | 1.50 | 1.71 | 1.01 | | | 1.019 | **400** | 1.108 | 16.2 | #1 15%, #2 75/58 | 3 | 3760 | #3 | | 92" | 80" | 2268.5 |
| 5/11 | GF,SB,GC | | | **8.8** | 9.1 | 9.1 | 8.9 | 8.9 | 8.4 | 8.3 | 8.4 | 8.5 | 3.15 | 58 | 8.0 | 8.2 | 8.0 | 8.4 | 2.90 | 3.30 | 1.96 | | | 1.019 | **400** | 1.107 | 16.1 | #1 15%, #2 80/53 | 3 | 1540 | 0:01 | cont. | 92" | 70" | 2269.0 (1.0mg) |
| 5/12 | GF,SB,GC | 2435 | 2.44 | **8.8** | 8.7 | 8.7 | 8.9 | 8.9 | 8.5 | 8.4 | 8.4 | 8.3 | 1.35 | 57 | 7.9 | 8.4 | 7.8 | 8.3 | 2.70 | 2.37 | 1.96 | | | 1.022 | **400** | 1.096 | 14.6 | #1 15%, #2 85/53 | 3 | 1180 | cont. | | 42" | 28" | 2270.0 (1.5mg) |
| 5/13 | GF,SB,GC | | | **8.8** | 9.0 | 9.0 | 8.8 | 8.8 | 8.5 | 8.6 | 8.4 | 8.4 | 1.23 | 58 | 7.8 | 8.4 | 8.3 | 8.4 | 1.70 | 2.05 | 2.17 | | | 1.024 | **400** | 1.096 | 14.6 | 157/53 | 3 | 1270 | cont. | | 48" | 30" | 2271.0 (2.25) |
| 5/14 | GF,SB,GC | 2225 | 2.68 | **8.8** | 8.9 | 9.0 | 8.8 | 8.9 | 8.4 | 8.6 | 8.2 | 8.3 | 1.06 | 57 | 8.3 | 8.4 | 8.2 | 8.3 | 2.10 | 2.74 | 1.92 | | | 1.016 | **400** | 1.093 | 14.2 | 191/53 | 3 | 1580 | cont. | | 57" | 38" | 2271.0 (2.25) |
| 5/15 | GF,SB,GC | 1320 | | **8.8** | 8.9 | 9.0 | 8.8 | 8.8 | 8.6 | 8.6 | 8.5 | 8.4 | 1.63 | 60 | 8.4 | 8.4 | 8.3 | 8.4 | 2.40 | 1.93 | 1.93 | | | 1.019 | **400** | 1.098 | 14.9 | 175/53 | 3 | 1045 | cont. | | 60" | 48" | 2268.5 (0.75mg) |
| 5/16 | GF,SB,GC | | | **8.8** | 8.8 | 9.0 | 8.8 | 8.8 | 9.2 | 9.3 | 9.0 | 8.9 | 2.24 | 59 | 8.7 | 9.0 | 8.7 | 8.8 | 1.80 | 2.74 | 2.25 | | | 1.024 | **400** | 1.092 | 14.0 | 225/50 | 3 | 475 | cont. | 9:00 | 53" | 34" | 2268.5 |
| 5/17 | GF,SB,GC | 2153 | 2.66 | **8.8** | 8.9 | 8.9 | 8.8 | 8.8 | 8.8 | 8.7 | 8.6 | 8.7 | 2.62 | 58 | 8.6 | 8.5 | 8.5 | 8.6 | 1.30 | 2.48 | 2.82 | 9.17 | 7.2c | 1.034 | **400** | 1.093 | 14.2 | 265/50 | 3 | 330 | | | 56" | 38" | 2269.0 (1.0mg) |
| 5/18 | GF,GC | | | **8.8** | 8.8 | 8.9 | 8.8 | 8.8 | 8.7 | 8.6 | 8.6 | 8.5 | 2.15 | 58 | 8.5 | 8.5 | 8.5 | 8.3 | 1.20 | 2.08 | 2.90 | | | 1.034 | **400** | 1.092 | 14.0 | 259/50 | 3 | 330 | | | 56" | 33 | 2269.0 |
| 5/19 | GC | | | **8.8** | 8.8 | 8.9 | 8.8 | 8.8 | 8.8 | 8.7 | 8.6 | 8.6 | 1.15 | 57 | 8.5 | 8.5 | 8.5 | 8.5 | 1.40 | 1.39 | 2.89 | | | 1.033 | **400** | 1.093 | 14.2 | 270/50 | 3 | 325 | | | 61" | 44" | 2269.0 |
| 5/20 | SB | | | **8.8** | 8.8 | 8.8 | 8.8 | 8.8 | 8.5 | 8.6 | 8.5 | 8.6 | 1.11 | 54 | 8.5 | 8.5 | 8.5 | 8.5 | 1.40 | 1.06 | 2.93 | | | 1.031 | **400** | 1.092 | 14.0 | 277/50 | 3 | 300 | | | 63" | 40" | 2269.0 |
| 5/21 | GF,SB | 2105 | 2.77 | **8.8** | 8.8 | 8.9 | 8.6 | 8.5 | 8.5 | 8.4 | 8.4 | 7.8 | 0.86 | 55 | 8.5 | 8.6 | 8.4 | 8.5 | 1.40 | 0.87 | 2.85 | | | 1.027 | **400** | 1.090 | 13.7 | 287/46 | 3 | 280 | | | 41" | 27" | 2269.0 |
| 5/22 | GF,SB,GC | | | 8.6 | 8.7 | 8.7 | 8.6 | 8.5 | 8.5 | 8.6 | 8.4 | 8.4 | 1.03 | 56 | 8.5 | 8.4 | 8.4 | 8.4 | 1.30 | 0.90 | 2.86 | | | 1.027 | **400** | 1.092 | 14.0 | 262/38 | 3 | 280 | | | 52" | 29" | 2269.0 |
| 5/23 | GF,SB,GC | | | 8.6 | 8.6 | 8.6 | 8.6 | 8.6 | 8.3 | 8.3 | 8.3 | 8.3 | 1.10 | 58 | 8.4 | 8.3 | 8.4 | 8.3 | 1.00 | 1.20 | 2.86 | 9.35 | 8.1c | 1.034 | **400** | 1.082 | 12.6 | 220/38 | 3 | 280 | | | 45" | 25" | 2269.0 |
| 5/24 | GF,SB,GC | 1885 | 2.63 | 8.6 | 8.6 | 8.7 | 8.6 | 8.6 | 8.2 | 8.3 | 8.2 | 8.3 | 0.66 | 59 | 8.4 | 8.2 | 8.3 | 8.2 | 0.90 | 0.88 | 2.57 | | | 1.034 | **400** | 1.078 | 12.0 | 233/38 | 3 | 250 | | | 48" | 30" | 2269.0 |
| 5/25 | GF | | | 8.6 | 8.6 | 8.5 | 8.6 | 8.5 | 8.2 | 8.2 | 8.2 | 8.2 | 0.90 | 60 | 8.0 | 8.0 | 8.0 | 8.0 | 0.90 | 0.95 | 2.56 | | | 1.029 | **400** | 1.078 | 12.0 | 250/38 | 3 | 250 | | | 30" | 15" | 2269.0 |
| 5/26 | SB | | | 8.6 | 8.5 | 8.5 | 8.6 | 8.5 | 8.0 | 8.2 | 8.0 | 8.1 | 1.16 | 58 | 8.2 | 8.2 | 8.2 | 8.3 | 0.90 | 1.20 | 2.59 | | | 1.031 | **400** | 1.079 | 12.2 | 235/35 | 3 | 220 | | | 57" | 36" | 2269.0 |
| 5/27 | SB | | | 8.6 | 8.5 | 8.5 | 8.6 | 8.6 | 8.1 | 8.3 | 8.0 | 8.2 | 1.06 | 57 | 8.2 | 8.3 | 8.2 | 8.2 | 0.90 | 1.11 | 2.59 | | | 1.032 | **400** | 1.077 | 11.9 | 248/35 | 3 | 200 | | | 42" | 24" | 2269.0 |
| 5/28 | SB | 1875 | 2.66 | 8.6 | 8.5 | 8.5 | 8.5 | 8.5 | 8.1 | 8.3 | 8.1 | 8.3 | 0.97 | 57 | 8.2 | 8.3 | 8.2 | 8.2 | 0.90 | 0.91 | 2.58 | | | 1.032 | **400** | 1.079 | 12.2 | 267/35 | 3 | 200 | | | 33" | 14" | 2269.0 |
| 5/29 | GF,SB,GC | | | 8.6 | 8.6 | 8.6 | 8.3 | 8.3 | 8.2 | 8.3 | 8.2 | 8.3 | 0.99 | 56 | 8.5 | 8.3 | 8.3 | 8.2 | 0.90 | 0.94 | 2.58 | | | 1.033 | **400** | 1.079 | 12.2 | 265/35 | 3 | 100 | | | 44" | 23" | 2269.0 |
| 5/30 | GF,SB,GC | | | 8.6 | 8.6 | 8.6 | 8.5 | 8.6 | 8.3 | 8.3 | 8.2 | 8.3 | 0.80 | 57 | 8.3 | 8.2 | 8.3 | 8.3 | 0.90 | 0.80 | 2.63 | | | 1.040 | **400** | 1.079 | 12.2 | 274/35 | 3 | 150 | | | 43" | 20" | 2269.0 |
| 5/31 | GF,SB,GC | 1888 | 2.52 | 8.6 | 8.6 | 8.5 | 8.5 | 8.4 | 8.2 | 8.4 | 8.2 | 8.2 | 0.88 | 54 | 8.3 | 8.3 | 8.3 | 8.2 | 0.90 | 0.75 | 2.63 | | | 1.048 | **400** | 1.078 | 12.0 | 280/35 | 3 | 150 | | | | | 2269.0 (1.0mg) |
| Averages: | | | | 8.66 | 8.7 | 8.68 | 8.62 | 8.61 | 8.43 | 8.41 | 8.36 | 8.33 | 1.19 | 55 | 8.22 | 8.30 | 8.20 | 8.28 | | | | 9.28 | | 1.03 | | | | | | 643 | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 19931 | | | | | |
| **Notes:** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | 11,958,600 | Gallons | | | | |

05-01-18 Sludge wasting will be based on sludge depth and not weight as normal. Operators will attempt to maintain 60" to 30" of sludge 10' out from the Clarifier center well.

05-01-18 Flocculant dosage is approximately 1.7 PPM. KT flow is now 3.2 mgd (2200 gpm) flocculant mixing is 4 pounds per foot in the mixing tank.

05-02-18 Flocculant dosage is approximately 2.0 PPM. KT flow is now 3.2 mgd (2200 gpm) flocculant mixing is 5 pounds per foot in the mixing tank.

05-07-18 10:00 - 13:00 Diverted KT flow to the lined storage pond and activated the #2 & #3 lined storage pond pumps. The water in the lined storage pond is mostly PTM discharge water.

05-08-18 05:30 Increased the process pH set point to 8.60 from 8.50 as the KT flow increased and the sludge bed level increased. Increased the lime valve open time to 46 seconds from 44.

05-08-18 08:00 Removed the lime slurry dilution water from the lime mixing process in an attempt to increase the lime slurry solids and control the pH swings.

05-08-18 11:00 Increased the flocculant injection to 2.6 PPM from approximately 2.0 PPM.

05-08-18 12:45 Diverted KT flow of approximately 2400 gpm to the lined storage pond. Activated the #3 lined pond pump to aid in stabilizing the pH.

05-08-18 The #1 sludge wasting pump at 1000 gpm was activated at 12:55 to aid in removing the 72" of sludge bed in the Clarifier. **582,600 gallons of sludge wasted 05-08-18**

05-08-18 #1 lime injection pump and valve placed into service at 10% continuously open. #2 remains automated to control pH at set point of 8.60.

05-08-18 17:00 pH set point increased from 8.6 to 8.7

05-08-18 19:40 KT flow decreased from approximately 2300 gpm to 1300 gpm. KT flow to the CTP #3 Lined Pond Pump Off.

05-09-18 01:00 006 flow meter is at 1470 gpm. **03:00 pH set point 8.80**

05-09-18 11:00 Opened Lime Slurry dilution water valve to 13 gpm. #1 lime injection valve continuous at 15% open.

05-09-18 04:00 Lime slurry dilution water was shut off. The slurry tank was decreasing in level while the slaker was operating **1,200,000 gallons of sludge wasted 05-09-18**

05-10-18 1,200,000 gallons of sludge wasted the past 24 hours.

05-10-18 07:15 The Aeration Basin pH probe failed. Operators replaced the failed probe. The replacement probe was calibrated using 7.0 and 10.0 buffer.

05-10-18 08:00 Slaker B Failed to run. City water low pressure alarm. Water pressure was verified at 70 psi, alarm was reset. Slaker performed a complete run cycle with no further issues.

05-10-18 13:40 Increased flocculent dosage from 4ppm to 5ppm **2,256,000 gallons of sludge wasted 05-10-18**

05-11-18 00:00 KT flow to the lined storage pond, #3 lined pond pump on. Flocculant dosage reduced from 5ppm to 3.5 ppm.

05-11-18 02:30 Reduced the sludge wasting to 600 gpm from 1000 gpm in an attempt to build sludge weight. **924,000 gallons of sludge wasted 05-11-18**

05-12-18 07:00 KT flow 2435 gpm (3.51 mgd) ph 2.44

05-12-18 13:30 #1 lime injection pump flushed with water and taken back out of service. **711,780 gallons of sludge wasted 05-12-18**

05-13-18 Placed slaker A into service, tested and is full operational if needed. **964,000 gallons of sludge wasted 05-13-18**

05-14-18 #1 sludge pump was used periodically as the #3 sludge pump did not reduce the sludge blanket. **948,000 gallons of sludge wasted 05-14-18**

05-15-18 #1 sludge pump was used periodically. **627,000 gallons of sludge wasted 05-15-18**

05-16-18 09:00 Mine water was diverted back to the CTP, Line pond valve was closed and #3 lined pond pump was turned off. The mine water flow to the CTP is approximately 2200 gpm.

05-22-18 06:00 Ph set point reduced to 8.60 from 8.80, treated outfall zinc results are below .200 mg/L at this time. 15 gpm lime slurry dilution water reestablished.

05-29-18 Discontinue to track and submit May 2018 Runoff Report.

**Bunker Hill Central Treatment Plant**
**Spring Run Off 2018**

| DATE | OP | Time | AERATION BASIN | | | CLARIFIER | | | CL. Trough | | | RECYCLE SG | | LIME SLURRY | | | SLUDGE PUMP #1 | | SLUDGE PUMP #3 | | SLUDGE GUN TEST | | Floc Pump | KELLOGG TUNNEL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | SET | pH1 | grab | pH2 | grab | TURB | pH3 | grab | TURB | SG | GPM | SG | %solid | Lime Injection Valve | 1000 GPM | | 600 GPM | | 10' Out | 20' Out | Setting | MGD | GPM | pH |
| | | | | | | | | | | | | | | | | Closed/Open | ON | OFF | ON | OFF | | | | | | |
| 05/21/18 | SB | 5:00 | **8.8** | 8.8 | 8.9 | 8.5 | 8.4 | 0.86 | 8.5 | 8.6 | 0.87 | 1.027 | 400 | 1.09 | 13.7 | #2 287/50 | | | | | 41" | 27" | 1.50 /2.0 PPM | 3.03 | 2105 | 2.77 |
| | SB | 10:45 | **8.8** | 8.8 | 8.8 | | | | | | | 1.029 | 400 | | | #2 270/46 | | | 11:00 | | 52" | 32" | 1.50 /2.0 PPM | | | |
| | SB/GF | 14:15 | **8.8** | 8.6 | 8.5 | 8.4 | 7.8 | 0.75 | 8.5 | 8.5 | 0.90 | 1.025 | 400 | | | #2 238/46 | | | | 14:00 | 38" | 24" | 1.50 /2.0 PPM | | | |
| | SB | 20:00 | **8.8** | 8.7 | 8.7 | 8.6 | 8.4 | 0.80 | 8.5 | 8.5 | 0.88 | 1.029 | 400 | | | #2 294/46 | 20:30 | | | | 56" | 33" | 1.50 /2.0 PPM | | | |
| | SB | 21:45 | **8.8** | | | | | | | | | 1.026 | 400 | | | #2 294/46 | | 21:30 | | | 31" | 18" | 1.50 /2.0 PPM | | | |
| 05/22/18 | GC, SB | 5:30 | **8.6** | 8.7 | 8.7 | 8.5 | 8.6 | 1.03 | 8.5 | 8.4 | 0.91 | 1.027 | 400 | | | #2 262/40 | | | | | 51" | 29" | 1.50 /2.0 PPM | | | |
| | GC | 9:30 | **8.6** | | | | | | | | | 1.031 | 400 | | | #2 250/38 | | | 11:00 | | 58" | 32" | 1.50 /2.0 PPM | | | |
| | SB/GF | 13:00 | **8.6** | 8.6 | 8.5 | 8.3 | 8.1 | 1.20 | 8.4 | 8.4 | 0.90 | 1.031 | 400 | | | #2 210/38 | | | | 13:30 | 48" | 26" | 1.50 /2.0 PPM | | | |
| | GC | 20:00 | **8.6** | | | | | | | | | 1.034 | 400 | | | #2 228/38 | 20:00 | | | | 50" | 29" | 1.50 /2.0 PPM | | | |
| | GC | 21:00 | **8.6** | | | | | | | | | 1.032 | 400 | | | #2 226/38 | | 21:00 | | | 30" | 12" | 1.50 /2.0 PPM | | | |
| 05/23/18 | GF | 4:30 | **8.6** | 8.6 | 8.6 | 8.3 | 8.3 | 1.10 | 8.4 | 8.3 | 1.20 | 1.034 | 400 | | | #2 220/38 | | | | | 45" | 25" | 1.50 /2.0 PPM | | | |
| | GF | 9:45 | **8.6** | | | | | | | | | 1.035 | 400 | | | #2 220/38 | | | 11:00 | 13:30 | 46" | 26" | 1.50 /2.0 PPM | | | |
| | GF | 13:45 | **8.6** | 8.6 | 8.6 | 8.3 | 8.3 | 0.87 | 8.4 | 8.3 | 0.97 | 1.037 | 400 | | | #2 224/38 | | | | | 38" | 22" | 1.50 /2.0 PPM | | | |
| | SB | 19:00 | **8.6** | | | | | | | | | | 400 | | | #2 220/38 | 20:00 | 21:00 | | | 48" | 30" | 1.50 /2.0 PPM | | | |
| 05/24/18 | SB | 5:30 | **8.6** | 8.6 | 8.7 | 8.2 | 8.3 | 0.90 | 8.4 | 8.4 | 0.97 | 1.340 | 400 | | | #2 233/38 | 12:00 | 13:30 | | | 51" | 33" | 1.50 /2.0 PPM | 2.71 | 1885 | 2.63 |
| | GF | 14:00 | **8.6** | | | | | | | | | 1.032 | 400 | | | #2 242/38 | | | | | 18" | 8" | 1.50 /2.0 PPM | | | |
| | SB | 21:00 | **8.6** | | | | | | | | | 1.034 | 400 | | | #2 247/38 | 20:00 | 21:00 | | | 24" | 13" | 1.50 /2.0 PPM | | | |
| 05/25/18 | GF | 4:30 | **8.6** | 8.6 | 8.5 | 8.2 | 8.2 | 0.90 | 8.0 | 8.0 | 0.95 | 1.029 | 400 | | | #2 250/38 | | | | | 30" | 15" | 1.50 /2.0 PPM | | | |
| | GF | 9:30 | **8.6** | | | | | | | | | 1.031 | 400 | | | #2 220/**35** | | | | | 45" | 25" | 1.50 /2.0 PPM | | | |
| | GF | 12:30 | **8.6** | 8.5 | 8.5 | 8.2 | 8.2 | 0.90 | 8.0 | 8.0 | 0.95 | 1.034 | 400 | | | #2 234/**35** | 12:30 | 13:30 | | | 38" | 22" | 1.50 /2.0 PPM | | | |
| | GF | 18:00 | **8.6** | | | | | | | | | 1.031 | 400 | | | #2 234/**35** | 18:00 | 19:00 | | | 40" | 22" | 1.50 /2.0 PPM | | | |
| 05/26/18 | SB | 5:30 | **8.6** | 8.5 | 8.5 | 8.0 | 8.2 | 1.16 | 8.2 | 8.2 | 1.20 | 1.031 | 400 | | | #2 235/**35** | | | | | 57" | 36" | 1.50 /2.0 PPM | | | |
| | SB | 6:35 | **8.6** | | | | | | | | | 1.026 | 400 | | | #2 236/**35** | 6:35 | 7:35 | | | 27" | 14" | 1.50 /2.0 PPM | | | |
| | SB | 13:35 | **8.6** | 8.6 | 8.5 | 8.0 | 8.1 | 0.94 | 8.2 | 8.3 | 1.05 | 1.028 | 400 | | | #2 239/**35** | | | | | 31" | 19" | 1.50 /2.0 PPM | | | |
| | SB | 19:45 | **8.6** | 8.6 | 8.6 | 8.0 | 8.2 | 0.90 | 8.2 | 8.3 | 0.98 | 1.031 | 400 | | | #2 236/**35** | 20:00 | 21:00 | | | 48" | 29" | 1.50 /2.0 PPM | | | |
| 05/27/18 | SB | 5:30 | **8.6** | 8.5 | 8.5 | 8.1 | 8.3 | 1.06 | 8.2 | 8.3 | 1.11 | 1.032 | **400** | | | #2 248/35 | | | | | 42" | 24" | 1.50 /2.0 PPM | | | |
| | SB | 7:50 | **8.6** | | | | | | | | | 1.032 | **400** | | | #2 248/35 | 6:45 | 7:45 | | | 22" | 12" | 1.50 /2.0 PPM | | | |
| | SB | 13:30 | **8.6** | 8.6 | 8.6 | 8.0 | 8.2 | 0.93 | 8.2 | 8.2 | 0.98 | 1.029 | **400** | | | #2 250/35 | | | | | 25" | 15" | 1.50 /2.0 PPM | | | |
| | SB | 20:00 | **8.6** | | | | | | | | | 1.032 | **400** | | | #2 259/35 | 20:00 | 21:00 | | | 36" | 20" | 1.50 /2.0 PPM | | | |
| 05/28/18 | SB | 5:30 | **8.6** | 8.5 | 8.5 | 8.1 | 8.3 | 0.97 | 8.2 | 8.3 | 0.91 | 1.032 | **400** | | | #2 267/35 | | | 5:50 | 8:50 | 33" | 14" | 1.50 /2.0 PPM | | | |
| | SB | 7:30 | **8.6** | | | | | | | | | | **400** | | | #2 267/35 | | | | | | | 1.50 /2.0 PPM | 2.70 | 1875 | 2.66 |
| | SB | 9:30 | **8.6** | | | | | | | | | 1.024 | **400** | | | #2 266/35 | | | | | 14" | 10" | 1.50 /2.0 PPM | | | |
| | SB | 13:30 | **8.6** | 8.5 | 8.5 | 8.1 | 8.3 | 0.88 | 8.2 | 8.2 | 0.85 | 1.028 | **400** | | | #2 256/35 | | | | | 20" | 12" | 1.50 /2.0 PPM | | | |
| | SB | 19:00 | **8.6** | | | | | | | | | 1.031 | **400** | | | #2 265/35 | | | 19:15 | 19:35 | 30" | 16" | 1.50 /2.0 PPM | | | |

# JANUARY 2018 - DECEMBER 2018 BHCTP LIME USAGE AFW/WOOD

| | Silo A | | | | | | Silo B | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | Initial Level | Final Level | Diff. (ft) | Diff. (tons) | Tons Added | Net Tons | Initial Level | Final Level | Diff. (ft) | Diff. (tons) | Tons Added | Net Tons | Net Tons | Tons/Day |
| Jan 1 - Jan 31 | 11.70 | 13.30 | -1.6 | -8.6 | 72.20 | 63.6 | 16.30 | 16.30 | 0.0 | 0.0 | 0.00 | 0.0 | 63.6 | 2.05 |
| Feb 1-Feb 28 | 13.30 | 15.50 | -2.2 | -11.9 | 40.50 | 28.6 | 16.30 | 13.80 | 2.5 | 13.5 | 42.10 | 55.6 | 84.2 | 3.01 |
| Mar 1 - Mar 31 | 15.30 | 15.30 | 0.0 | 0.0 | 0.00 | 0.0 | 13.80 | 10.00 | 3.8 | 20.5 | 81.00 | 101.5 | 101.5 | 3.27 |
| April 1 - April 30 | 15.30 | 15.30 | 0.0 | 0.0 | 0.00 | 0.0 | 10.00 | 13.00 | -3.0 | -16.2 | 150.70 | 134.5 | 134.5 | 4.48 |
| May 1 - May 31 | 15.30 | 17.00 | -1.7 | -9.2 | 41.50 | 32.3 | 13.00 | 10.00 | 3.0 | 23.8 | 333.50 | 357.3 | 389.7 | 12.57 |
| | | | | **Silo A** | **112.70** | | | | | **Silo B** | **273.80** | | 63.6 | |
| | | | | | **Tdl Tons Purchased** | **386.50** | | | | | | | **Average** | **5.08** |

NOTES:
08-22-17 Slaker B (Silo B) removed from service, Slake A (Silo A) placed into service - Six Month Rotation- Lime loop #2 off, Lime loop #1 on
Six Month Rotation - January 1, 2018 A= 11.7 B = 16.3
01-23-18 Lime loop #1 removed from service, lime loop #2 placed into service. #1 lime loop discharge pipe found leaking, will be replaced asap.
01-24-18 Lime loop #1 repaired and placed into service as the primary lime slurry injection system. Lime loop #2 was also repaired.
02-12-18 Slaker A (Silo A) removed from service, Slake B (Silo B) placed into service - Six Month Rotation- Lime loop #1 off, Lime loop #2 on
Six Month Rotation - February 11, 2018 A= 15.0 B = 16.3

| | **Silo A** | **Silo B** | |
|---|---|---|---|
| | **17.0** | **9.1** | **FT** |
| 6.20 Tons per foot = | **105.4** | **56.4** | **Tons** |
| 30% Contingency | **-31.6** | **-16.9** | **FT** |
| Working Tons | **73.8** | **39.5** | |
| Past 7 days usage | **4.8** | **4.8** | **Tons/day** |

**Days of usage remaining not including 30% contingency**

| | | | |
|---|---|---|---|
| Days remaining | **15.4** | **8.2** | **23.6** |

**Lime Daily Use - 7 Days**

| | Silo A | | | | | | Silo B | | | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Initial Level | Final Level | Diff. (ft) | Diff. (tons) | Tons Added | Net Tons | Initial Level | Final Level | Diff. (ft) | Diff. (tons) | Tons Added | Net Tons | Net Tons | Tons/Day |
| 05/29-05/31 | 17.00 | 17.00 | 0.0 | 0.0 | 0.00 | 0.0 | 13.00 | 10.00 | 3.0 | 16.1 | 0.00 | 16.1 | 16.1 | 8.07 |

**Lime Silo A Depth Readings**

| **Date** | **Prior** | **After** | **Tons Received** | **Tons/ft** |
|---|---|---|---|---|
| 1/8/2018 | 9.9 | 14.4 | 33.70 | 7.49 |
| 1/29/2018 | 8.8 | 13.8 | 38.50 | 7.70 |
| 2/14/2018 | 9.4 | 15.0 | 40.50 | 7.23 |
| **1 Month Average:** | | | | **7.47** |

**Flocculant Received**

| | | |
|---|---|---|
| 10/19/2017 | 2200 lbs | |
| 12/12/2017 | 4400 lbs | |
| 3/19/2018 | 4400 lbs | 7/weeks |
| 4/10/2018 | | 4400lbs ordered/Est. Delivery 05-29-18 |

**Lime Silo B Depth Readings**

| **Date** | **Prior** | **After** | **Tons Received** | **Tons/ft** |
|---|---|---|---|---|
| 2/26/2018 | 8.5 | 14.5 | 42.10 | 7.02 |
| 3/7/2018 | 9.8 | 16.4 | 42.50 | 6.44 |
| 3/19/2018 | 10.0 | 16.4 | 38.50 | 6.02 |
| 4/2/2018 | 9.0 | 14.2 | 35.20 | 6.77 |
| 4/11/2018 | 10.3 | 15.9 | 38.50 | 6.88 |
| 4/20/2018 | 10.1 | 15.7 | 38.50 | 6.88 |
| 4/30/2018 | 7.9 | 13.5 | 38.50 | 6.88 |
| 5/4/2018 | 8.5 | 13.5 | 38.50 | 7.70 |
| 5/8/2018 | 9.0 | 13.5 | 38.50 | 8.56 |
| 5/10/2018 | 5.2 | 7.7 | 31.10 | 12.44 |
| 5/11/2018 | 5.0 | 9.1 | 39.50 | 9.63 |
| 5/15/2018 | 3.5 | 10.3 | 38.50 | 5.66 |
| 5/16/2018 | 7.0 | 12.0 | 38.50 | 7.70 |
| 5/17/2018 | 10.7 | 17.0 | 41.50 | 6.59 |
| 5/18/2018 | 12.5 | 17.0 | 33.00 | 7.33 |
| 5/23/2018 | 7.0 | 12.5 | 38.50 | 7.00 |
| 5/26/2018 | 10.5 | 16.0 | 37.40 | 6.80 |
| **1 Month Average:** | | | | **7.94** |

## LIME DEMAND TRACKING

| Year | Month | Lime (tons) | KT flow (mg) | Lime Demand (g/L) | |
|---|---|---|---|---|---|
| 2006 | Jan. | 70.2 | 56.0 | 0.30 | |
| | Feb. | 69.9 | 51.2 | 0.33 | |
| | March | 96.3 | 56.3 | 0.41 | |
| | April | 107.5 | 72.0 | 0.36 | |
| | May | 235.4 | 72.0 | 0.78 | peak |
| | June | 114.6 | 68.3 | 0.40 | |
| | July | 100.4 | 64.0 | 0.38 | |
| | Aug. | 118.2 | 64.1 | 0.44 | |
| | Sept. | 38.4 | 54.5 | 0.17 | |
| | Oct. | 69.5 | 57.6 | 0.29 | |
| | Nov. | 71.3 | 55.2 | 0.31 | |
| | Dec. | 78.2 | 60.5 | 0.31 | |
| 2007 | Jan. | 66.0 | 56.3 | 0.28 | |
| | Feb. | 51.8 | 50.5 | 0.25 | |
| | March | 81.7 | 65.4 | 0.30 | |
| | April | 127.9 | 66.6 | 0.46 | |
| | May | 154.0 | 63.2 | 0.58 | peak |
| | June | 94.1 | 57.9 | 0.39 | |
| | July | 107.0 | 58.3 | 0.44 | |
| | Aug. | 75.8 | 55.3 | 0.33 | |
| | Sept. | 77.2 | 50.5 | 0.37 | |
| | Oct. | 62.3 | 50.1 | 0.30 | |
| | Nov. | 56.9 | 50.8 | 0.27 | |
| | Dec. | 28.1 | 52.0 | 0.13 | |
| 2008 | Jan. | 60.7 | 53.4 | 0.27 | |
| | Feb. | 50.2 | 49.3 | 0.24 | |
| | March | 58.0 | 54.6 | 0.25 | |
| | April | 78.3 | 61.7 | 0.30 | |
| | May | 629.3 | 86.7 | 1.74 | peak |
| | June | 388.1 | 82.6 | 1.13 | |
| | July | 155.6 | 66.3 | 0.56 | |
| | Aug. | 129.5 | 65.2 | 0.48 | |
| | Sept. | 97.2 | 61.1 | 0.38 | |
| | Oct. | 76.4 | 58.7 | 0.31 | |
| | Nov. | 64.9 | 52.0 | 0.30 | |
| | Dec. | 73.0 | 55.7 | 0.31 | |
| 2009 | Jan. | 70.3 | 50.9 | 0.33 | |
| | Feb. | 60.3 | 48.2 | 0.30 | |
| | March | 62.1 | 61.7 | 0.24 | |
| | April | 88.0 | 63.1 | 0.33 | |
| | May | 180.9 | 70.2 | 0.62 | peak |
| | June | 146.3 | 64.6 | 0.54 | |
| | July | 104.4 | 61.6 | 0.41 | |
| | Aug. | 94.8 | 56.4 | 0.40 | |
| | Sept. | 89.2 | 57.0 | 0.38 | |
| | Oct. | 69.4 | 55.8 | 0.30 | |
| | Nov. | 70.9 | 55.0 | 0.31 | |
| | Dec. | 47.4 | 54.5 | 0.21 | |
| 2010 | Jan. | 66.7 | 55.5 | 0.29 | |
| | Feb. | 51.5 | 50.8 | 0.24 | |
| | March | 49.5 | 54.7 | 0.22 | |
| | April | 50.0 | 56.3 | 0.21 | |
| | May | 58.7 | 58.8 | 0.24 | |
| | June | 58.8 | 56.8 | 0.25 | |
| | July | 79.7 | 56.7 | 0.34 | peak |
| | Aug. | 54.7 | 56.2 | 0.23 | |
| | Sept. | 63.8 | 54.1 | 0.28 | |
| | Oct. | 54.6 | 55.4 | 0.24 | |
| | Nov. | 54.1 | 55.8 | 0.23 | |
| | Dec. | 64.5 | 54.6 | 0.28 | |
| 2011 | Jan. | 77.1 | 61.7 | 0.30 | |
| | Feb. | 69.8 | 54.6 | 0.31 | |
| | March | 94.7 | 61.4 | 0.37 | |
| | April | 119.6 | 65.6 | 0.44 | |
| | May | 433.0 | 84.4 | 1.23 | peak |
| | June | 328.4 | 80.0 | 0.98 | |
| | July | 159.9 | 79.3 | 0.48 | |
| | Aug. | 120.8 | 70.3 | 0.41 | |
| | Sept. | 92.4 | 60.4 | 0.37 | |
| | Oct. | 97.8 | 62.4 | 0.38 | |
| | Nov. | 66.8 | 58.4 | 0.27 | |
| | Dec. | 65.2 | 58.6 | 0.27 | |
| 2012 | Jan. | 74.9 | 58.4 | 0.31 | |
| | Feb. | 56.8 | 57.7 | 0.24 | |
| | March | 85.6 | 67.2 | 0.31 | |
| | April | 194.8 | 81.2 | 0.57 | |
| | May | 261.6 | 86.8 | 0.72 | peak |
| | June | 179.9 | 83.4 | 0.52 | |

## LIME DEMAND TRACKING

| Year | Month | Lime (tons) | KT flow (mg) | Lime Demand (g/L) | |
|---|---|---|---|---|---|
| | July | 140.8 | 74.3 | 0.45 | |
| | Aug. | 118.0 | 68.9 | 0.41 | |
| | Sept. | 95.6 | 62.2 | 0.37 | |
| | Oct. | 89.0 | 60.0 | 0.36 | |
| | Nov. | 73.3 | 57.2 | 0.31 | |
| | Dec. | 74.8 | 61.8 | 0.29 | |
| 2013 | Jan. | 57.2 | 61.9 | 0.22 | |
| | Feb. | 64.5 | 59.4 | 0.26 | |
| | March | 71.7 | 66.2 | 0.26 | |
| | April | 96.9 | 69.6 | 0.33 | |
| | May | 126.2 | 71.5 | 0.42 | peak |
| | June | 94.1 | 64.6 | 0.35 | |
| | July | 91.2 | 62.8 | 0.35 | |
| | Aug. | 89.2 | 58.4 | 0.37 | |
| | Sept. | 65.2 | 58.0 | 0.27 | |
| | Oct. | 59.3 | 58.3 | 0.24 | |
| | Nov. | 50.9 | 56.2 | 0.22 | |
| | Dec. | 49.9 | 56.9 | 0.21 | |
| 2014 | Jan. | 38.7 | 57.4 | 0.16 | |
| | Feb. | 35.8 | 54.6 | 0.16 | |
| | March | 73.1 | 65.3 | 0.27 | |
| | April | 101.1 | 65.6 | 0.37 | |
| | May | 208.3 | 80.6 | 0.62 | peak |
| | June | 127.4 | 65.6 | 0.47 | |
| | July | 87.5 | 63.4 | 0.33 | |
| | Aug. | 81.1 | 61.5 | 0.32 | |
| | Sept. | 63.7 | 56.3 | 0.27 | |
| | Oct. | 53.1 | 60.6 | 0.21 | |
| | Nov. | 62.8 | 55.0 | 0.27 | |
| | Dec. | 54.6 | 59.7 | 0.22 | |
| 2015 | Jan. | 51.7 | 58.4 | 0.21 | |
| | Feb. | 61.0 | 59.7 | 0.24 | |
| | March | 83.1 | 64.4 | 0.31 | |
| | April | 94.8 | 63.0 | 0.36 | peak |
| | May | 73.3 | 62.0 | 0.28 | |
| | June | 69.7 | 65.3 | 0.26 | |
| | July | 83.6 | 55.6 | 0.36 | |
| | Aug. | 58.4 | 55.3 | 0.25 | |
| | Sept. | 55.3 | 53.9 | 0.25 | |
| | Oct. | 56.8 | 52.0 | 0.26 | |
| | Nov. | 46.3 | 49.8 | 0.22 | |
| | Dec. | 43.7 | 51.5 | 0.20 | |
| 2016 | Jan. | 24.2 | 52.2 | 0.11 | |
| | Feb. | 33.4 | 53.6 | 0.15 | |
| | March | 66.0 | 64.0 | 0.25 | |
| | April | 86.1 | 63.3 | 0.33 | |
| | May | 96.9 | 58.1 | 0.40 | peak |
| | June | 69.9 | 53.1 | 0.32 | |
| | July | 68.2 | 56.5 | 0.29 | |
| | Aug. | 53.7 | 53.2 | 0.24 | |
| | Sept. | 53.6 | 49.8 | 0.26 | |
| | Oct. | 49.8 | 52.4 | 0.23 | |
| | Nov. | 48.7 | 53.8 | 0.22 | |
| | Dec. | 48.3 | 52.0 | 0.22 | |
| 2017 | Jan. | 51.7 | 49.3 | 0.25 | |
| | Feb. | 46.9 | 53.7 | 0.21 | |
| | March | 140.0 | 59.0 | 0.57 | |
| | April | 174.5 | 61.9 | 0.68 | |
| | May | 246.6 | 84.2 | 0.70 | peak |
| | June | 143.5 | 73.1 | 0.47 | |
| | July | 141.6 | 69.4 | 0.49 | |
| | Aug. | 87.6 | 58.5 | 0.36 | |
| | Sept. | 100.8 | 67.4 | 0.36 | |
| | Oct. | 60.8 | 43.5 | 0.34 | |
| | Nov. | 91.0 | 72.4 | 0.30 | |
| | Dec. | 76.3 | 67.3 | 0.27 | |
| 2018 | Jan. | 63.6 | 56.5 | 0.27 | |
| | Feb. | 84.2 | 61.0 | 0.33 | |
| | March | 101.5 | 68.9 | 0.35 | |
| | April | 129.1 | 74.1 | 0.42 | |
| | May | 349.7 | 92.4 | 0.91 | peak |

## KELLOGG TUNNEL ZINC DATA

| | | | Concentration (mg/L) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
| Jan. | | 86 | 81 | 79 | 63 | 70 | 61 | 72 | 57 | 68 | 41 | 46 | 50 | 53 | 53 |
| Feb. | | 86 | 91 | 96 | 55 | 72 | 57 | 95 | 58 | 68 | 41 | 68 | 52 | 50 | 85 |
| March | | 94 | 116 | 86 | 65 | 68 | 53 | 86 | 58 | 69 | 58 | 81 | 63 | 124 | 88 |
| April | | 98 | 121 | 140 | 85 | 80 | 50 | 137 | 176 | 86 | 107 | 92 | 115 | 238 | 118 |
| May | | 105 | 231 | 179 | 318 | 136 | 57 | 377 | 215 | 150 | 177 | 87 | 138 | 206 | 274 |
| June | | 107 | 182 | 118 | 271 | 143 | 68 | 347 | 164 | 106 | 131 | 78 | 108 | 145 | |
| July | | 90 | 144 | 111 | 198 | 117 | 75 | 181 | 136 | 87 | 87 | 75 | 81 | 97 | |
| Aug. | | 87 | 112 | 92 | 132 | 94 | 79 | 130 | 110 | 86 | 76 | 66 | 76 | 98 | |
| Sept. | | 84 | 107 | 80 | 107 | 76 | 81 | 132 | 107 | 75 | 66 | 63 | 68 | 75 | |
| Oct. | 59 | 81 | 100 | 88 | 99 | 75 | 70 | 86 | 70 | 67 | 63 | 54 | 52 | 53 | |
| Nov. | 66 | 79 | 88 | 88 | 104 | 63 | 57 | 95 | 71 | 70 | 55 | 44 | 52 | 58 | |
| Dec. | 67 | 62 | 78 | 65 | 76 | 59 | 61 | 88 | 69 | 54 | 49 | 55 | 50 | 60 | |
| **average** | **64** | **88** | **121** | **102** | **131** | **88** | **64** | **152** | **108** | **82** | **79** | **67** | **75** | **105** | |
| | | | | | | | | | | | | | | | |
| **lime usage (tons/day)** | | **2.59** | **3.23** | **2.76** | **4.78** | **3.24** | **2.16** | **4.31** | **3.93** | **2.46** | **2.70** | **1.99** | **1.93** | **3.60** | |
| **Zinc Conc. Increase/Decrease** | | | **37%** | **-16%** | **29%** | **-33%** | **-27%** | **138%** | **-29%** | **-24%** | **-4%** | **-15%** | **12%** | **39%** | |
| **Lime Usage Increase/Decrease** | | | **25%** | **-15%** | **73%** | **-32%** | **-33%** | **100%** | **-9%** | **-37%** | **10%** | **-26%** | **-3%** | **87%** | |

## KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2000-2009

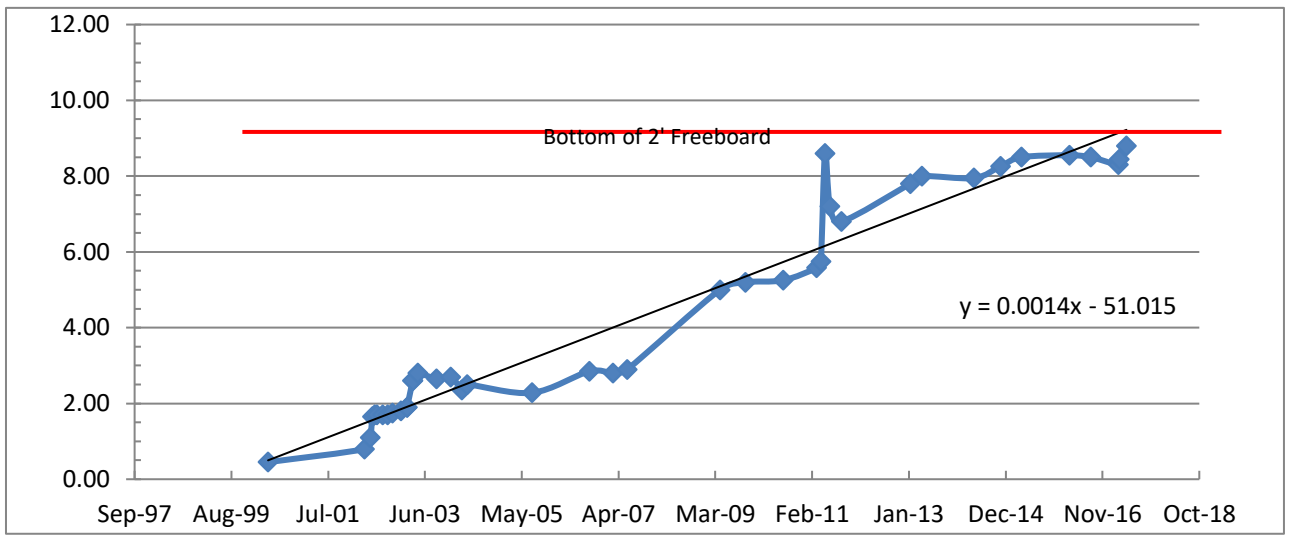
| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Jan.** | 61,000,000 | 61,677,510 | 54,606,100 | 53,066,890 | 52,223,080 | 53,150,000 | 56,050,900 | 56,281,000 | 53,465,820 | 50,936,960 |
| **Feb.** | 57,600,000 | 45,584,000 | 52,840,000 | 46,493,470 | 48,306,920 | 49,860,000 | 51,188,000 | 50,511,300 | 49,282,209 | 48,146,111 |
| **March** | 60,730,000 | 57,740,360 | 50,452,060 | 60,162,290 | 59,852,720 | 58,073,000 | 56,332,830 | 65,443,650 | 54,578,130 | 61,712,540 |
| **April** | 68,680,000 | 54,846,000 | 65,583,230 | 63,335,350 | 50,715,310 | 53,775,350 | 72,039,280 | 66,636,500 | 61,690,530 | 63,055,350 |
| **May** | **97,719,900** | 57,501,901 | 76,082,410 | 63,335,350 | 53,245,000 | 54,181,650 | 72,027,000 | 63,203,308 | 86,680,760 | 70,233,580 |
| **June** | 69,800,000 | 55,835,590 | 67,299,960 | 59,532,434 | 50,451,170 | 51,750,000 | 68,385,600 | 57,981,410 | 82,622,590 | 64,623,180 |
| **July** | 63,698,850 | 53,652,330 | 64,820,120 | 66,252,746 | 56,538,980 | 55,255,000 | 64,054,000 | 58,282,900 | 66,324,500 | 61,535,000 |
| **Aug.** | 66,707,120 | 45,289,000 | 58,212,940 | 62,074,750 | 52,002,140 | 49,970,000 | 64,621,000 | 55,335,900 | 65,168,620 | 56,446,670 |
| **Sept.** | 55,797,530 | 50,276,020 | 60,140,460 | 43,789,000 | 49,208,020 | 49,987,000 | 54,515,270 | 50,471,870 | 61,074,020 | 57,006,430 |
| **Oct.** | 60,424,720 | 50,660,840 | 54,485,871 | 52,869,290 | 59,601,690 | 52,807,000 | 57,610,030 | 50,086,330 | 58,666,300 | 55,830,000 |
| **Nov.** | 53,408,660 | 50,660,840 | 51,072,259 | 47,600,000 | 51,948,000 | 50,722,600 | 55,191,700 | 50,779,040 | 52,041,780 | 54,956,800 |
| **Dec.** | 56,414,870 | 53,464,780 | 56,034,000 | 56,413,080 | 56,770,000 | 54,904,400 | 60,486,900 | 53,716,210 | 55,727,260 | 54,542,700 |
| **Totals** | 771,981,650 | 637,189,171 | 711,629,410 | 674,924,650 | 640,863,030 | 634,436,000 | 732,502,510 | 678,729,418 | 747,322,519 | 699,025,321 |

## KELLOGG TUNNEL ANNUAL DISCHARGE FLOWS 2010-2019

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Jan.** | 55,503,180 | 61,797,170 | 58,434,610 | **61,855,400** | 57,478,450 | 58,440,540 | 52,196,750 | 49,352,650 | 56,555,500 | |
| **Feb.** | 50,819,910 | 54,556,227 | 57,763,170 | 59,383,290 | 54,607,950 | 59,767,470 | 53,694,400 | 53,675,440 | **61,451,600** | |
| **March** | 54,691,420 | 61,373,630 | 67,236,650 | 66,264,780 | 65,396,350 | 64,468,230 | 63,967,920 | 58,977,410 | **68,907,980** | |
| **April** | 56,255,340 | 65,687,340 | **81,233,630** | 69,619,100 | 65,618,770 | 63,056,840 | 63,323,620 | 61,947,620 | 74,055,850 | |
| **May** | 58,825,640 | 84,365,390 | **86,826,340** | 71,496,380 | 80,598,590 | 61,898,200 | 58,147,240 | 84,208,690 | 92,414,520 | |
| **June** | 56,770,200 | 79,985,540 | **83,440,990** | 64,663,900 | 65,623,330 | 56,368,540 | 53,149,810 | 73,144,700 | | |
| **July** | 56,727,510 | **79,346,330** | 74,315,690 | 62,844,790 | 63,425,030 | 55,655,000 | 56,521,710 | 69,470,550 | | |
| **Aug.** | 56,239,370 | **70,377,570** | 68,986,900 | 58,459,380 | 61,486,270 | 55,316,100 | 53,293,430 | 58,550,600 | | |
| **Sept.** | 54,109,980 | 60,404,280 | **62,270,300** | 58,097,500 | 56,279,590 | 53,890,000 | 49,796,420 | 67,447,510 | | |
| **Oct.** | 55,480,200 | **62,403,480** | 59,991,850 | 58,325,780 | 60,659,850 | 52,082,800 | 52,417,120 | 43,469,300 | | |
| **Nov.** | 54,856,880 | **58,430,700** | 57,184,220 | 56,215,000 | 55,065,100 | 49,812,540 | 53,815,710 | 72,434,860 | | |
| **Dec.** | 54,607,330 | 58,617,700 | **61,750,390** | 56,932,530 | 59,770,540 | 51,521,900 | 52,063,110 | 67,280,860 | | |
| **Totals** | 664,886,960 | 797,345,357 | **819,434,740** | **744,157,830** | **746,009,820** | **682,278,160** | **662,387,240** | **759,960,190** | **353,385,450** | **0** |

Yellow indicates record monthly flow as well as record annual flow

# Bunker Hill Sludge Pond
## Sludge Staff Gauge Reading Summary




| Date | Sludge Level (feet) | Estimated Sludge Elevation | Estimated Remaining Height to Road (feet) | |
|---|---|---|---|---|
| 05/19/00 | 0.45 | | | |
| 04/16/02 | 0.80 | | | |
| 05/28/02 | 1.10 | | | |
| 06/13/02 | 1.65 | | | |
| 07/01/02 | 1.70 | | | |
| 07/16/02 | 1.70 | | | |
| 08/27/02 | 1.70 | | | |
| 10/01/02 | 1.70 | | | |
| 11/06/02 | 1.75 | | | |
| 01/06/03 | 1.80 | | | |
| 02/19/03 | 1.90 | | | |
| 02/19/03 | 1.90 | | | |
| 03/31/03 | 2.60 | | | |
| 04/01/03 | 2.60 | | | |
| 05/07/03 | 2.80 | | | |
| 09/19/03 | 2.65 | | | |
| 01/01/04 | 2.70 | | | |
| 03/22/04 | 2.36 | | | |
| 04/29/04 | 2.50 | 2311 | 11.0 | |
| 08/09/05 | 2.28 | 2310.8 | 11.2 | |
| 09/30/06 | 2.85 | 2311.4 | 10.7 | |
| 03/20/07 | 2.80 | 2311.3 | 10.7 | |
| 6/30/2007 | 2.90 | 2311.4 | 10.6 | |
| 4/30/2009 | 5.00 | 2313.5 | 8.50 | |
| 10/31/2009 | 5.20 | 2313.7 | 8.30 | |
| 7/31/2010 | 5.25 | 2313.8 | 8.25 | |
| 3/31/2011 | 5.58 | 2314.1 | 7.92 | |
| 4/30/2011 | 5.75 | 2314.3 | 7.75 | |
| 5/30/2011 | 8.60 | 2317.1 | 4.90 | |
| 7/5/2011 | 7.20 | 2315.7 | 6.30 | |
| 9/26/2011 | 6.80 | 2315.3 | 6.70 | |
| 2/4/2013 | 7.80 | 2316.3 | 5.70 | |
| 4/30/2013 | 8.00 | 2316.5 | 5.50 | |
| 5/12/2014 | 7.95 | 2316.5 | 5.55 | |
| 11/20/2014 | 8.26 | 2316.8 | 5.24 | |
| 4/20/2015 | 8.50 | 2317.0 | 5.00 | |
| 4/1/2016 | 8.55 | 2317.1 | 4.95 | |
| 9/1/2016 | 8.50 | 2317.0 | 5.00 | |
| 3/20/2017 | 8.30 | 2316.8 | 5.20 | |
| 3/28/2017 | 8.45 | 2317.0 | 5.05 | |
| 5/18/2017 | 8.80 | 2317.3 | 4.70 | |
| 7/31/2017 | 8.75 | 2317.3 | 4.75 | |
| 11/15/2017 | 8.80 | 2317.3 | 4.70 | |
| 3/1/2018 | 9.14 | 2317.6 | 4.36 | 03-08-18 Polishing Pond Cleanout to CIA |
| 3/27/2018 | 9.15 | 2317.7 | 7.35 | Wood Env. Elevation of 2325 |
| 4/9/2018 | 9.25 | 2320.8 | 4.25 | |
| 5/1/2018 | 9.30 | 2320.8 | 4.20 | |
| 5/31/2018 | 9.80 | 2321.3 | 3.70 | |
| **6586** | **9.35** | **Total Change, Days and Feet** | | |
| Note 3 | 0.52 | Average Rise Per Year (Includes Lined Pond Cleanout), feet | | |
| | 3.70 | Estimated average remaining total height to perimeter road, feet | | |
| | 2.0 | Assumed desired end-of-life freeboard, feet | | |
| | 1.7 | Estimated available storage height, feet | | |
| | **3.28** | **Estimated Remaining Life (years)** | | |
| | 7/19/2021 | | | |

Notes:

1) Pond perimeter road at SE pond corner elevation 2325.0 **4-23-18 GF Sludge Elevation 2321.1 Staff 9.25'**

2) Pond area is approximately 220,000 square feet (not used in calculations)

3) Average Rise Per Year conservatively includes Lined Pond muck because some portion would have made CTP sludge if it had not precipitated in Lined Pond

## *WATER QUANTITIES FROM CLARIFIER*

| *Date* | *Loads* | *Gallons* |
|---|---|---|
| 1-May | 0 | 0 |
| 2-May | 0 | 0 |
| 3-May | 0 | 0 |
| 4-May | 0 | 0 |
| 5-May | 0 | 0 |
| 6-May | 0 | 0 |
| 7-May | 0 | 0 |
| 8-May | 0 | 0 |
| 9-May | 0 | 0 |
| 10-May | 0 | 0 |
| 11-May | 0 | 0 |
| 12-May | 0 | 0 |
| 13-May | 0 | 0 |
| 14-May | 0 | 0 |
| 15-May | 0 | 0 |
| 16-May | 0 | 0 |
| 17-May | 0 | 0 |
| 18-May | 1 | 4,000 |
| 19-May | 2 | 8,000 |
| 20-May | 0 | 0 |
| 21-May | 0 | 0 |
| 22-May | 0 | 0 |
| 23-May | 0 | 0 |
| 24-May | 0 | 0 |
| 25-May | 0 | 0 |
| 26-May | 0 | 0 |
| 27-May | 0 | 0 |
| 28-May | 0 | 0 |
| 29-May | 0 | 0 |
| 30-May | 0 | 0 |
| 31-May | 0 | 0 |
| | | 0 |
| ***Totals:*** | ***3*** | ***12,000*** |

***Using a 4,000 Gallon Water Truck***

# CTP Mine Water Line Open Channel Inspection Form

**Note: This form should be utilized weekly during the regular channel cleanout.**
**Results will be include with the Daily Quality Control Report and monthly DMR.**

Date: May 03, 2018 Inspected By: Steve Brunner, Gary Coast

| Item Inspected | Condition | Comments |
|---|---|---|
| Channel Sections and Joints | **Good** / Poor | Check for cracks Ok |
| Channel Inlet Connection @ KT | **Good** / Poor | Check for cracks Ok |
| Channel Outlet/Pipeline Inlet | **Good** / Poor | Check for cracks Ok |
| Channel Bottom (during low flows) | **Good** / Poor | Concrete walls show signs of pitting/corrosion |
| Bottom Joints (during low flows) | **Good** / Poor | Ok |
| Trash Rack Assembly Rail Units | **Good** / Poor | Check for corrosion and bolt tightness Ok |
| Trash Racks | **Good** / Poor | Wood debris was removed |
| Parshall Flume | **Good** / Poor | Check fiberglass and joint connections Ok<br>Flume staff gauge needs replaced |

General Comments:

The Kellogg Tunnel flow at this time is 3.02 mgd (2110gpm), pH at this time is 2.72.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed no debris from the trash racks during this cleaning event.

CTP operators had no contact with any mine personnel during this cleaning event.

# CTP Mine Water Line Open Channel Inspection Form

**Note: This form should be utilized weekly during the regular channel cleanout.**
**Results will be include with the Daily Quality Control Report and monthly DMR.**

Date: May 10, 2018 Inspected By: Steve Brunner, Gary Coast

| Item Inspected | Condition | Comments |
|---|---|---|
| Channel Sections and Joints | **Good** / Poor | Check for cracks Ok |
| Channel Inlet Connection @ KT | **Good** / Poor | Check for cracks Ok |
| Channel Outlet/Pipeline Inlet | **Good** / Poor | Check for cracks Ok |
| Channel Bottom (during low flows) | **Good** / Poor | Concrete walls show signs of pitting/corrosion |
| Bottom Joints (during low flows) | **Good** / Poor | Ok |
| Trash Rack Assembly Rail Units | **Good** / Poor | Check for corrosion and bolt tightness Ok |
| Trash Racks | **Good** / Poor | Wood debris was removed |
| Parshall Flume | **Good** / Poor | Check fiberglass and joint connections Ok<br>Flume staff gauge needs replaced |

General Comments:

The Kellogg Tunnel flow at this time is 3.65 mgd (2535 gpm), pH at this time is 2.59.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed wood and trash from the trash racks during this cleaning event.

CTP operators had no contact with any mine personnel during this cleaning event.

# CTP Mine Water Line Open Channel Inspection Form

**Note: This form should be utilized weekly during the regular channel cleanout.**
**Results will be include with the Daily Quality Control Report and monthly DMR.**

Date: May 17, 2018 Inspected By: Steve Brunner

| Item Inspected | Condition | Comments |
|---|---|---|
| Channel Sections and Joints | **Good** / Poor | Check for cracks Ok |
| Channel Inlet Connection @ KT | **Good** / Poor | Check for cracks Ok |
| Channel Outlet/Pipeline Inlet | **Good** / Poor | Check for cracks Ok |
| Channel Bottom (during low flows) | **Good** / Poor | Concrete walls show signs of pitting/corrosion |
| Bottom Joints (during low flows) | **Good** / Poor | Ok |
| Trash Rack Assembly Rail Units | **Good** / Poor | Check for corrosion and bolt tightness Ok |
| Trash Racks | **Good** / Poor | Wood debris was removed from both racks |
| Parshall Flume | **Good** / Poor | Check fiberglass and joint connections Ok<br>Flume staff gauge needs replaced |

General Comments:

The Kellogg Tunnel flow at this time is 3.10 mgd (2153 gpm), pH at this time is 2.66.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed wood debris from the mine discharge trash racks during this cleaning event.

No discussions occurred with any mine personnel.

# CTP Mine Water Line Open Channel Inspection Form

**Note: This form should be utilized weekly during the regular channel cleanout.**
**Results will be include with the Daily Quality Control Report and monthly DMR.**

Date: May 24, 2018 Inspected By: Steve Brunner, Gary Coast

| Item Inspected | Condition | Comments |
|---|---|---|
| Channel Sections and Joints | **Good** / Poor | Check for cracks Ok |
| Channel Inlet Connection @ KT | **Good** / Poor | Check for cracks Ok |
| Channel Outlet/Pipeline Inlet | **Good** / Poor | Check for cracks Ok |
| Channel Bottom (during low flows) | **Good** / Poor | Concrete walls show signs of pitting/corrosion |
| Bottom Joints (during low flows) | **Good** / Poor | Ok |
| Trash Rack Assembly Rail Units | **Good** / Poor | Check for corrosion and bolt tightness Ok |
| Trash Racks | **Good** / Poor | No debris ok |
| Parshall Flume | **Good** / Poor | Check fiberglass and joint connections Ok<br>Flume staff gauge needs replaced |

General Comments:

The Kellogg Tunnel flow at this time is 2.71 mgd (1885 gpm), pH at this time is 2.63.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed a large amount of wood debris from the trash racks during this cleaning event.

Operators replaced the ink cartridge in the KT flow meter printer.

No discussions occurred with any of the mine personnel.

# CTP Mine Water Line Open Channel Inspection Form

**Note: This form should be utilized weekly during the regular channel cleanout.**
**Results will be include with the Daily Quality Control Report and monthly DMR.**

Date: May 31, 2018 Inspected By: Steve Brunner, Gary Coast

| Item Inspected | Condition | Comments |
|---|---|---|
| Channel Sections and Joints | **Good** / Poor | Check for cracks Ok |
| Channel Inlet Connection @ KT | **Good** / Poor | Check for cracks Ok |
| Channel Outlet/Pipeline Inlet | **Good** / Poor | Check for cracks Ok |
| Channel Bottom (during low flows) | **Good** / Poor | Concrete walls show signs of pitting/corrosion |
| Bottom Joints (during low flows) | **Good** / Poor | Ok |
| Trash Rack Assembly Rail Units | **Good** / Poor | Check for corrosion and bolt tightness Ok |
| Trash Racks | **Good** / Poor | No debris ok |
| Parshall Flume | **Good** / Poor | Check fiberglass and joint connections Ok<br>Flume staff gauge needs replaced |

General Comments:

The Kellogg Tunnel flow at this time is 2.72 mgd (1888 gpm), pH at this time is 2.52.

The concrete flume walls are beginning to deteriorate approximately 6" up from the flume bottom.

The submerged area of the concrete is pitting and is now approximately 1/2" indented.

Alternate hand held staff gauge was used to verify flume staff gauge and flow meter readings.

Ultrasonic flow meter calibration was correct, no adjustments were needed.

Operators removed wood, trash and sand debris from the trash racks during this cleaning event.

No flow discussions occurred with any of the mine personnel.